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Laser System to Detonate Explosive Devices

The problem:

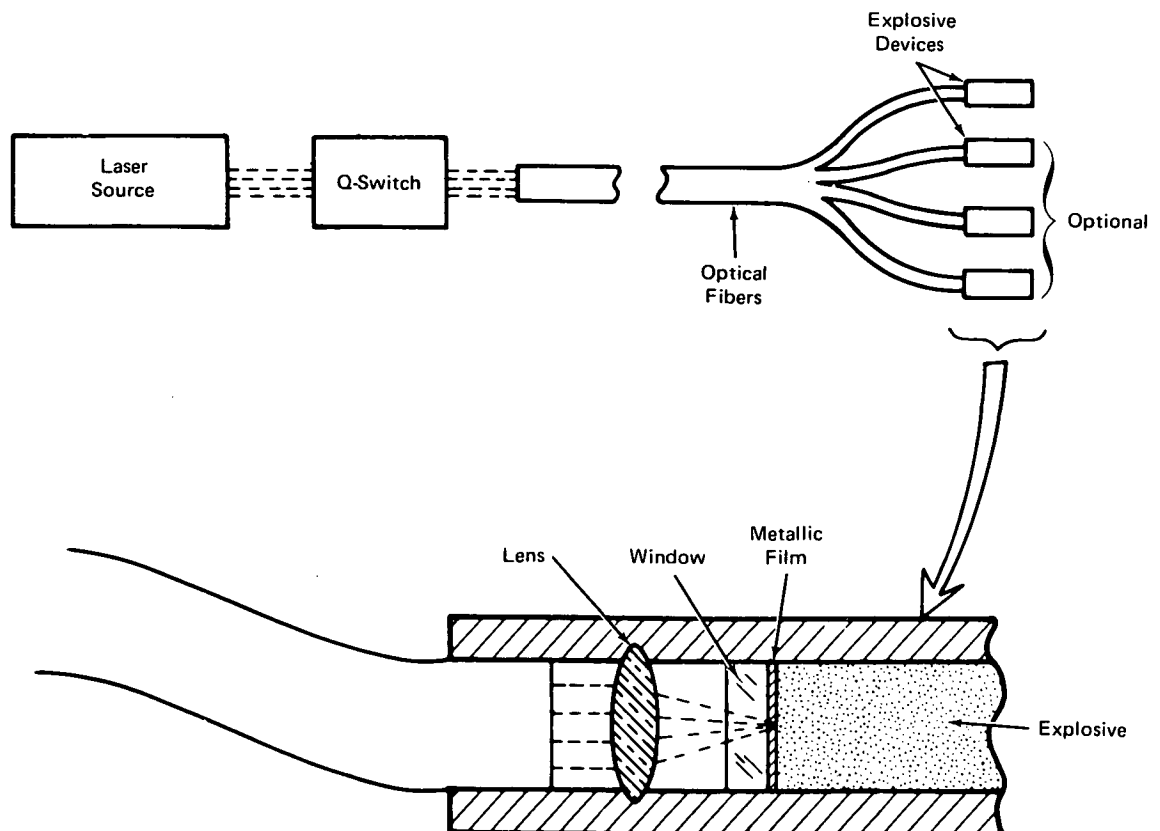
Small explosive devices are frequently used to activate or to disconnect some systems by remote control. They are initiated electrically by wires connected to power sources. Electrical initiation, however, can be started accidentally. When these devices are used on spacecraft or other complex systems, there are numbers of power cables and radio transmitters in the vicinities of the initiating wires. They can couple electromagnetically with the initiating wires and trigger explosions.

The solution:

A new laser detonating system is not affected by electromagnetic interference.

How it's done:

The system, as illustrated, includes a laser source, a Q-switch, and an optical fiber connected to the explosive device. The fiber can be branched out and connected to several devices for simultaneous detonation.



Laser System Connected to Explosive Device

(continued overleaf)

Immediate detonation is started by a laser pulse transmitted via optical fiber. The Q-switched transmitted pulse is focused by a converging lens through a window onto a thin metallic film (see figure). Energy from the pulse rapidly vaporizes the film, creating a plasma and shock wave. The high shock pressure immediately detonates the explosive. This procedure is approximately ten times faster than the electrical method. Because the shock is strong, less-sensitive secondary high explosives can be used, thereby increasing the margin of safety.

Note:

Requests for further information may be directed to:
Technology Utilization Officer
NASA Pasadena Office
4800 Oak Grove Drive
Pasadena, California 91103
Reference: TSP74-10194

Patent status:

This invention has been patented by NASA (U.S. Patent No. 3,812,783). Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to:

Patent Counsel
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under contract to
NASA Pasadena Office
(NPO-11743)